

WHAT IS CLAIMED IS:

1 1. A chemical compound, comprising:
2 an electron donor group;
3 an electron acceptor group; and
4 a conjugated bridging element, said electron donor group and said electron acceptor
5 group linked to each other via said conjugated bridging element,
6 wherein said chemical compound has a readily displaceable electron, a dipole
7 character is present only in the excited state, and said chemical compound is capable of
8 emitting photoluminescent radiation.

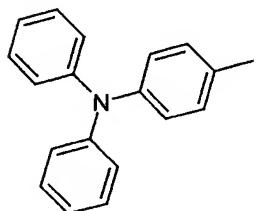
1 2. The compound according to claim 1, wherein the electron donor group is an
2 aromatic amine or a fused cyclic system.

1 3. The compound according to claim 1, wherein the electron donor group is
2 selected from the group consisting of triphenylamine, phenylenediamine and benzidine.

1 4. The compound according to claim 1, wherein the electron donor group is
2 selected from the group consisting of carbazole, thiophene, and oligomers thereof.

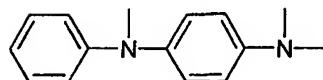
1 5. The compound according to claim 1, wherein the electron donor group is
2 selected from the group consisting of compounds of formulas 1a through 1d, thiophene, and
3 oligomers thereof:

4 [Formula 1a]



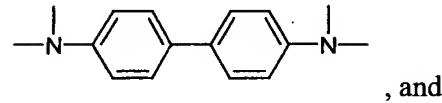
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6 [Formula 1b]



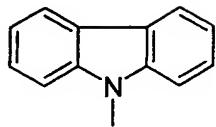
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8 [Formula 1c]



9 , and

10 [Formula 1d]



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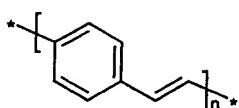
1 6. The compound according to claim 1, wherein the conjugated bridging element
2 has a π -conjugated carbon bond.

1 7. The compound according to claim 6, wherein the π -conjugated carbon bond is
2 included in an organic polymer with a chemical basic structure selected from the group
3 consisting of a phenylenevinylene moiety in the form of a monomer, an oligomer, a polymer
4 and a substituted product thereof, a phenylene moiety in the form of a monomer, an oligomer,
5 a polymer and a substituted product thereof, a fluorene moiety in the form of a monomer, an
6 oligomer, a polymer and a substituted product thereof, a vinylene moiety in the form of a
7 monomer, an oligomer, a polymer and a substituted product thereof, a ethinylene moiety in
8 the form of a monomer, an oligomer, a polymer and a substituted product thereof, an
9 anthranylene moiety in the form of a monomer, an oligomer, a polymer and a substituted

10 product thereof, a naphthylene moiety in the form of a monomer, an oligomer, a polymer and
11 a substituted product thereof.

1 8. The compound according to claim 6, wherein the conjugated bridging element
2 is selected from the group consisting of formulas 2a through 2g:

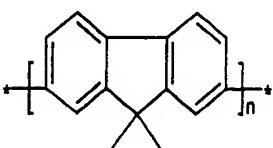
3 [Formula 2a]



4
5 wherein n is a number ranging from 1 to 20,
6 [Formula 2b]

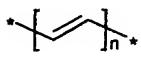


7
8 wherein n is a number ranging from 1 to 20,
9 [Formula 2c]



10
11 wherein n is a number ranging from 1 to 20,

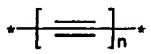
12 [Formula 2d]



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14 wherein n is a number ranging from 1 to 20,

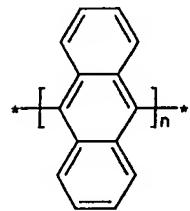
15 [Formula 2e]



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17 wherein n is a number ranging from 1 to 20,

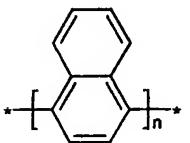
18 [Formula 2f]



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20 wherein n is a number ranging from 1 to 20, and

21 [Formula 2g]



22

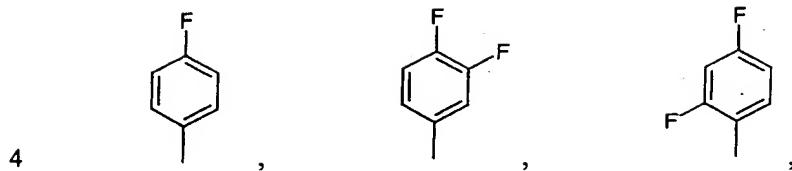
23 wherein n is a number ranging from 1 to 20.

1 9. The compound according to claim 1, wherein the electron acceptor group is

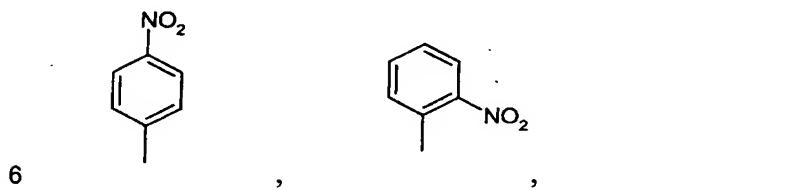
2 selected from the group consisting of monosubstituted phenyl, disubstituted phenyl,
3 trisubstituted phenyl, imide and anhydride of aromatic polycarboxylic acid, oxazole, and a
4 fused cyclic system.

1 10. The compound according to claim 9, wherein the electron acceptor group has
2 a chemical basic structure selected from the group consisting of a fluorine-substituted phenyl
3 group, a nitro-substituted phenyl group, a cyano-substituted phenyl group, imide and
4 anhydride of perylenetetracarboxylic acid and a substituted compound thereof, imide and
5 anhydride of naphthalenetetracarboxylic acid and a substituted compound thereof, oxadiazole
6 and a substituted compound thereof, oxazole and a substituted compound thereof, and a
7 fluorenylidene moiety and a substituted compound thereof.

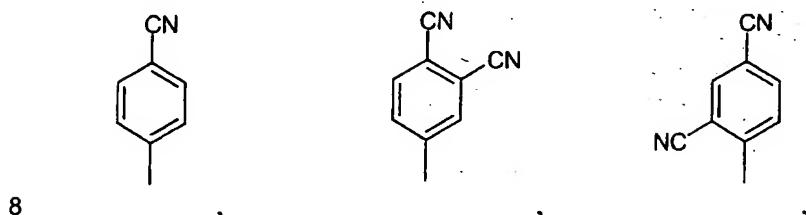
1 11. The compound according to claim 9, wherein the electron acceptor group is
2 selected from the group consisting of the following compounds of formulas 3a through 3m:
3 [Formula 3a] [Formula 3b] [Formula 3c]



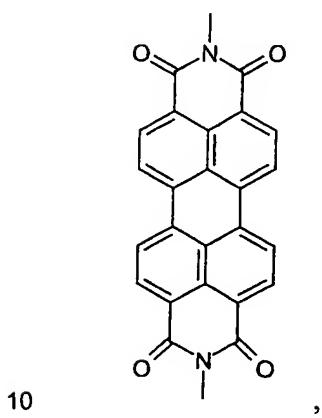
5 [Formula 3d] [Formula 3e]



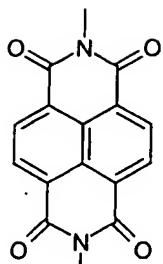
7 [Formula 3f] [Formula 3g] [Formula 3h]



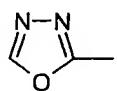
9 [Formula 3i]



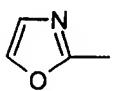
11 [Formula 3j]



13 [Formula 3k]

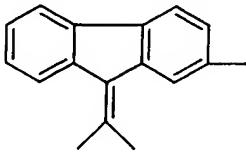


15 [Formula 3l]



, and

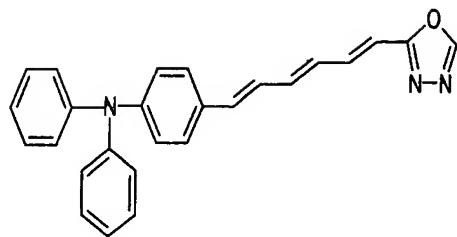
17 [Formula 3m]



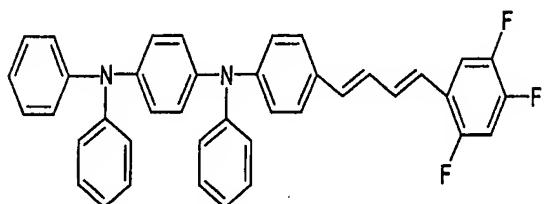
1 12. The compound according to claim 1, wherein the compound is selected from

2 the group consisting of the following compounds of formulas 4a through 4c:

3 [Formula 4a]

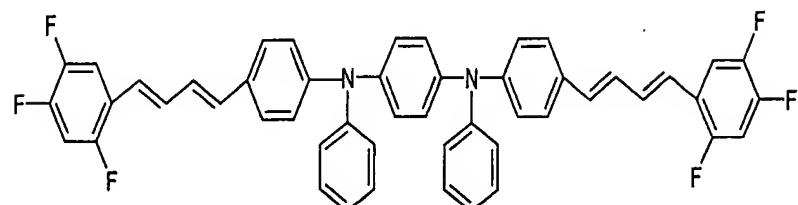


5 [Formula 4b]



6 , and

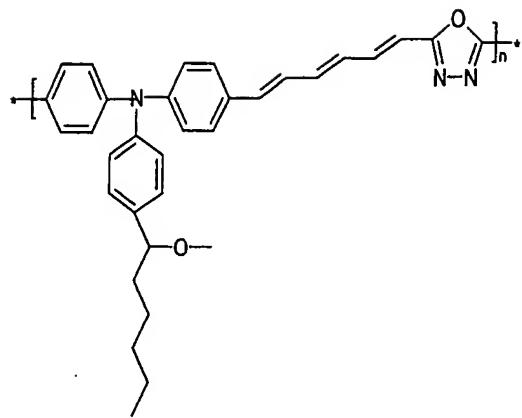
7 [Formula 4c]



13. The compound according to claim 1, wherein the compound is selected from

the group consisting of the following compounds of formula 5a through 5c:

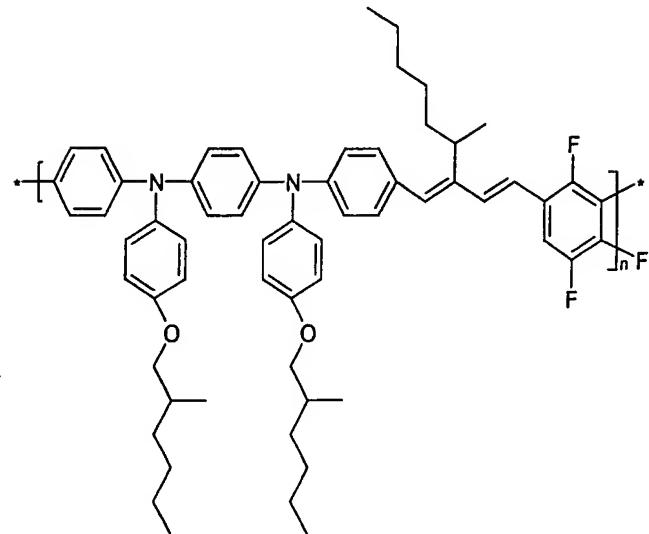
[Formula 5a]



4

5 wherein n is a number ranging from 100 to 2,000,

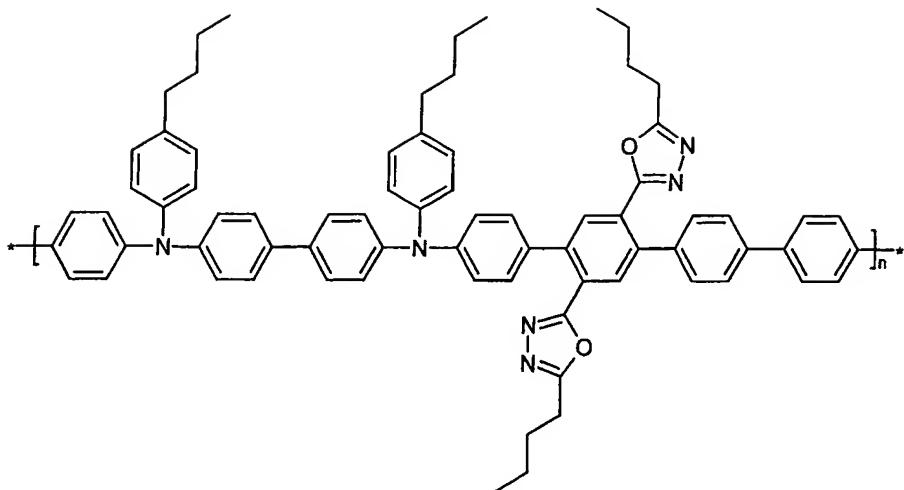
6 [Formula 5b]



7

8 wherein n is a number ranging from 100 to 2,000, and

9 [Formula 5c]



10

11 wherein n is a number ranging from 100 to 2,000.

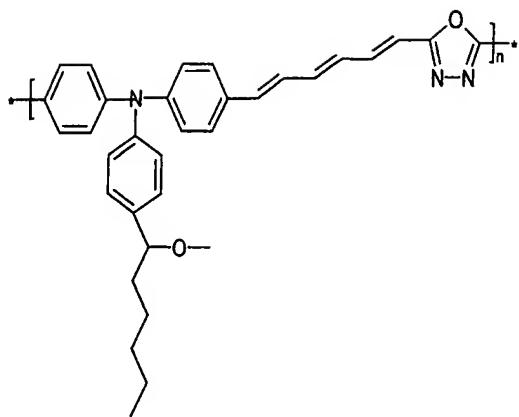
1 14. The compound according to claim 1, wherein the electron donor group is an
2 aromatic amine or a fused cyclic system, the conjugated bridging element has a π -conjugated
3 carbon bond, and the electron acceptor group is selected from the group consisting of
4 monosubstituted phenyl, disubstituted phenyl, trisubstituted phenyl, imide and anhydride of
5 aromatic polycarboxylic acid, oxazole, and a fused cyclic system.

1 15 The compound according to claim 14, wherein said conjugated bridging
2 element is a polymer having a main chain and a branched or side chain having an alkyl group
3 or an alkoxy group.

1 16. A photoluminescence quenching device, comprising the chemical compound
2 of claim 1.

1 17. The photoluminescence quenching device according to claim 16, wherein an
2 required electric field to quench half of photoluminescent radiation emitted without an
3 electric field is less than 1.5×10^8 V/m.

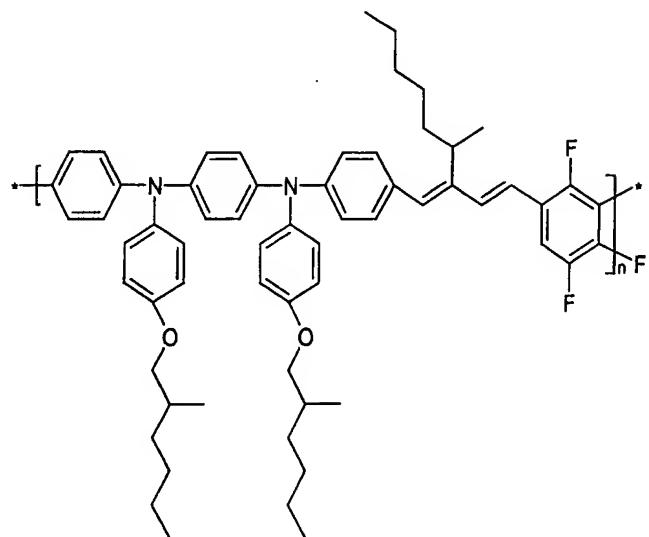
1 18. The photoluminescence quenching device according to claim 16, comprising:
2 a glass substrate;
3 a layer of conductive transparent indium-tin oxide (ITO) on said glass substrate;
4 a layer of poly(ethylenedioxythiophene)/polystyrenesulfonic acid conductive polymer
5 with a layer thickness of from 30 to 100 nm on said layer of conductive transparent
6 indium-tin-oxide;
7 an emitter polymer layer having a thickness of from 50 to 150 nm, said emitter
8 polymer layer having a material selected from the group consisting of the following
9 compounds of formula 5a through 5c:
10 [Formula 5a]



11

12 wherein n is a number ranging from 100 to 2,000,

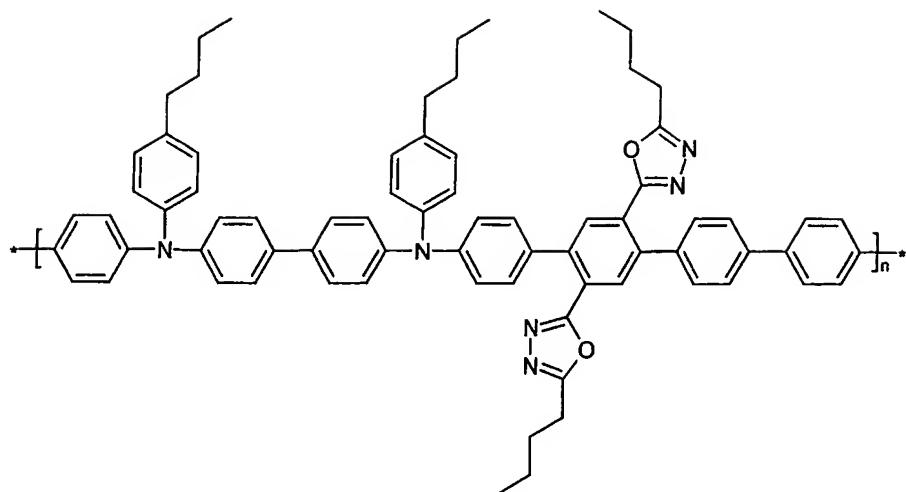
13 [Formula 5b]



14

15 wherein n is a number ranging from 100 to 2,000, and

16 [Formula 5c]



17

18 wherein n is a number ranging from 100 to 2,000;

19 a metal contact; and

20 an aluminum layer with a layer thickness of from 50 to 200 nm.

1 19. The photoluminescence quenching device according to claim 18, further

2 comprising an insulating film between the metal contact and the aluminum layer.

1 20. The photoluminescence quenching device according to claim 18, wherein

2 more than half of photoluminescent radiation is suppressed when applying a voltage of 15

3 volts.